Hypocalcemia associated with muscular weakness and recumbency in beef cows in western Saskatchewan

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Parturient paresis is common in high-producing dairy cows (1,2); such cows are usually hypocalcemic and hypophosphatemic. In beef cattle, parturient paresis is uncommon and paresis when observed may not be related to parturition but may be alimentary in origin. Diseases which depress intestinal tract motility in beef cattle may cause hypocalcemic paresis (1,3).

A syndrome has been observed in beef cattle in western Saskatchewan wherein beef cows show muscular weakness or recumbency. Veterinarians have treated this syndrome empirically with preparations containing calcium, phosphorus, and magnesium with various degrees of success. The question which remains to be answered is: Do such cows in fact have hypocalcemia and hypophosphatemia?

In this report we describe 22 cows of beef and dairy breeds with muscular weakness and recumbency. These cows were hypocalcemic and hypophosphatemic. The cows belonged to various herds in western Saskatchewan, and were either examined at the farm or at the authors' clinic.

Seven mature dairy cows (Holstein, Holstein-cross, and Jersey) exhibited the typical signs of parturient paresis including gastrointestinal tract (GIT) stasis, both post- and prepartum. Fifteen mature beef cows (four to eight years of age) were also examined. These cows, in good body condition, were previously healthy and suddenly showed muscular weakness or recumbency or both. Rectal temperature, heart rate, and respiratory rates were within normal limits. Gastrointestinal stasis commonly observed in dairy cows was not commonly detected in beef cows described herein. Unlike dairy cows, all of the beef cows had loose or watery feces except one cow which had GIT stasis. Watery feces could not be associated with intestinal parasites or other common etiologies. Beef cows examined were either in late pregnancy or several weeks postpartum. These cows were fed various kinds of hay, grains, and mineral supplements. Ration analysis of some herds showed calcium: phosphorus ratios as wide as 1:8.

Each cow (beef and dairy) was treated with two doses (intravenous and subcutaneous) of 500 mL Maglucal Plus (rogar/STB Inc, London, Ontario) or 500 mL of Cal-Nate (Langford Inc, Guelph, Ontario). Maglucal Plus contained 10.71 g of calcium gluconate, 5 g of phosphorus, and 2.7 g of magnesium chloride. Cal-Nate contained 115 g of calcium borogluconate. Maglucal Plus or Cal-Nate were supplemented with 50 mL of D-Phos (Langford Inc, Guelph, Ontario) containing 5 g of phosphorus. Prior to treating the cows, blood samples were collected. Serum calcium and phosphorus levels were determined using a Serometer (Mallinkrodt Inc, Raleigh, North Carolina) and calcium and phosphorus reagent test kits (Smith Kline Diagnostics Inc, Sunnyvale, California). For comparison, serum calcium and phosphorus levels were determined in 15 randomly selected normal beef cows from the same herds which had an affected cow. Where appropriate, the significance of a difference between the average of two samples was determined using a one-tailed Student's t test. Values at $p < 0.05$ were considered to be significantly different.

The seven dairy cows were hypocalcemic and hypophosphatemic (Table 1). They responded to treatment by getting up within 1–20 minutes posttreatment, and relapses did not occur. These results are similar to findings of others in cases of uncomplicated periparturient hypocalcemia (1).

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Eleven beef cows were recumbent when first seen and were hypocalcemic and hypophosphatemic (Table 1). Four beef cows with muscular weakness but not completely recumbent also were hypocalcemic and hypophosphatemic (Table 1). The serum calcium and phosphorus levels from beef cows with muscular weakness or recumbency were significantly low ($p < 0.05$) when compared with 15 normal beef cows (Table 1). These results suggest that as the blood calcium and phosphorus levels decrease, cows may progress from being weak to recumbent.

Unlike the dairy cows, the beef cows with hypocalcemia did not have GIT stasis. Also, these results are in contrast to previous reports about hypocalcemic beef cattle wherein GIT stasis was reported as a clinical sign associated with hypocalcemia (3). It is possible that hypocalcemia in beef cows is of alimentary origin rather than related to parturition as reported previously (3). Our observations suggest that hypocalcemia may be the result of decreased intestinal passage time of loose/watery feces through the GIT and resultant reduced absorption of calcium and phosphorus. Serum magnesium levels were not tested in our studies and the role of magnesium, if any, in muscular weakness and recumbency in beef cattle remains to be established. CVJ

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Table 1. Comparison of serum calcium and phosphorus levels in beef and dairy cows

Types of cows	Number	Calcium $\bar{x}$ (mmol/L) ± SD	Phosphorus $\bar{x}$ (mmol/L) ± SD
Normal beef cows	15	3.00 ± 0.19	2.05 ± 0.33
Beef cows recumbent	11	1.47 ± 0.20	0.71 ± 0.24
Beef cows weak but not recumbent	4	2.56 ± 0.36	1.23 ± 0.08
Dairy cows recumbent	7	1.18 ± 0.26	0.43 ± 0.13

Serum levels of calcium and phosphorus in recumbent beef cows, weak but not recumbent beef cows, and recumbent dairy cows are significantly different ($p < 0.05$) from normal beef cows

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